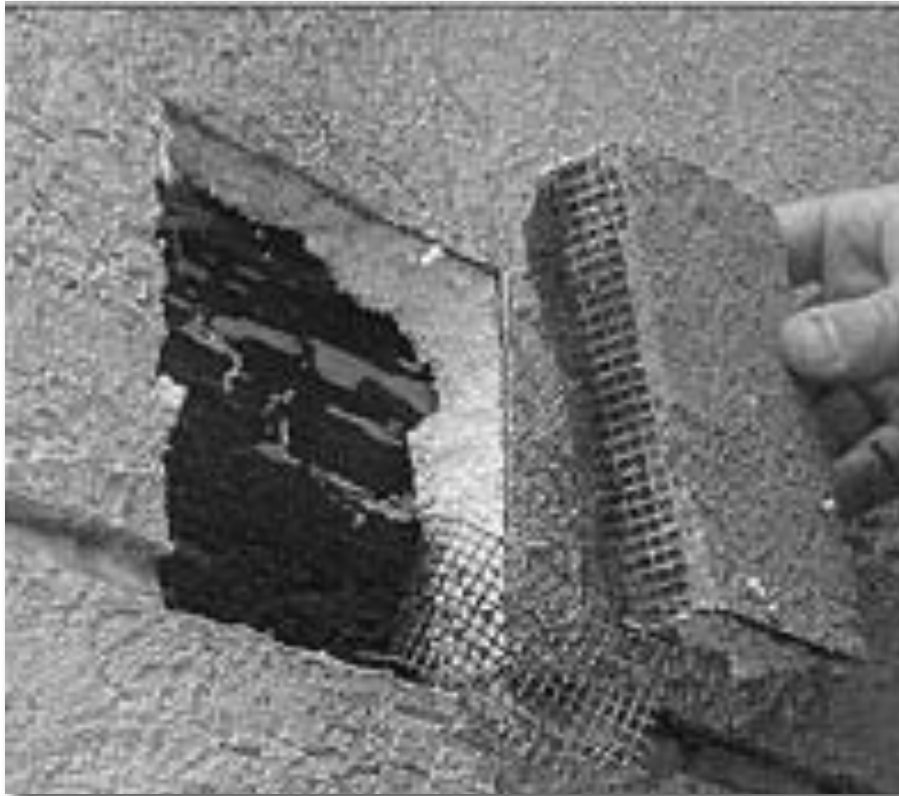


Thermal Imaging for Home Inspectors

Moisture in Building Materials – EIFS Flashing



EIFS control joint failure often leads to upward water migration (wicking) in the underlying sheathing material.

Cracks in the control joints, or the use of improper caulk or lack of backer rod are commonly seen.

Thermal Imaging for Home Inspectors

Moisture in Building Materials – EIFS Flashing



Lack of the proper flashing between the EIFS and surrounding wood trim (windows, doors, wall penetrations) can lead to wicking to the wood.

Flashing must be waterproof to avoid moisture migration.



Thermal Imaging for Home Inspectors

Moisture in Building Materials – Grading



Photos courtesy of Scott Wood.

©2009 InterNACHI. All Rights Reserved.

Thermal Imaging for Home Inspectors

Moisture in Building Materials – Kick out flashing



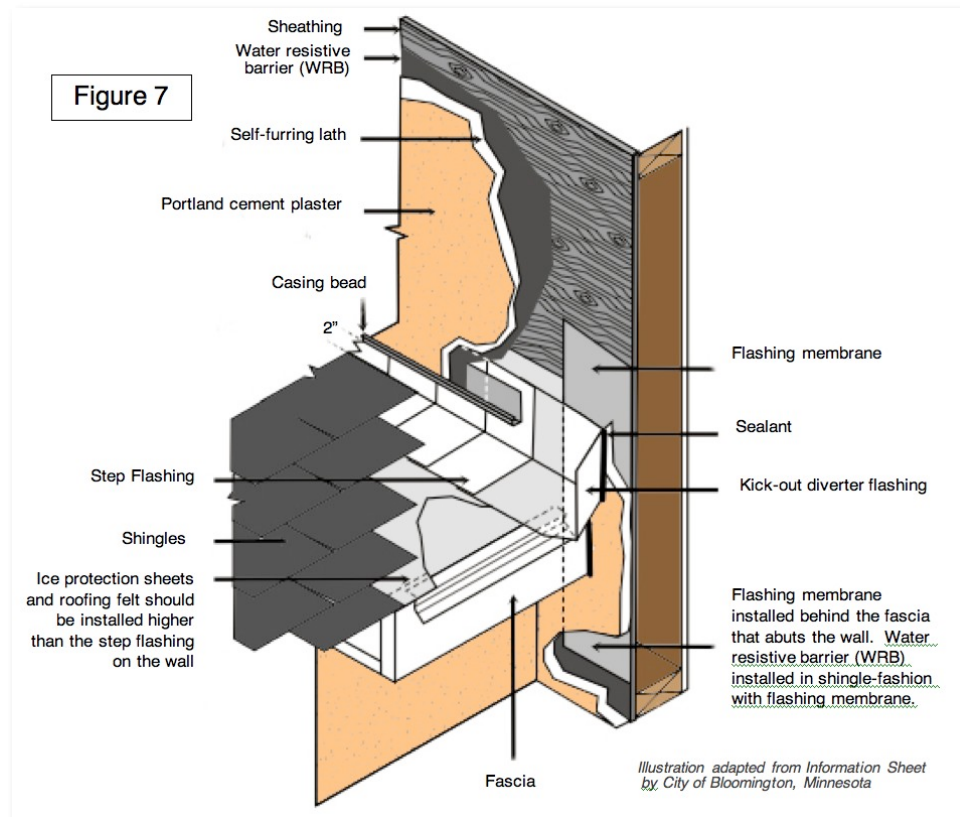
No kick out flashing
(and note the crack)
where roof surfaces
end.

Improper flashing at the
roof interface with mere
caulking.

The result?

Thermal Imaging for Home Inspectors

Moisture in Building Materials – Kick out flashing



Proper installation requires sheathing membrane, with a 2nd and 3rd layer on top of the step flashing tins and the step flashing to be installed behind the step tins.

Thermal Imaging for Home Inspectors

Moisture in Building Materials – Kick out flashing



Water leaks with accumulation of water in the Styrofoam, which is held against the underlying sheathing.

Also, note the lack of house wrap under the upper foam.

Improper installation, all around.



Thermal Imaging for Home Inspectors

Moisture in Building Materials - EIFS



Here we have a properly installed EIFS wall. Rake flashing is good and there is a kick out flashing installed.

BUT!

No one coordinated with the roofer and the downspout was installed improperly.

Excessive water drained to the lower roof will overcome even a good install.

Thermal Imaging for Home Inspectors

Moisture in Building Materials - EIFS



Thermal Imaging for Home Inspectors

Moisture in Building Materials – Siding



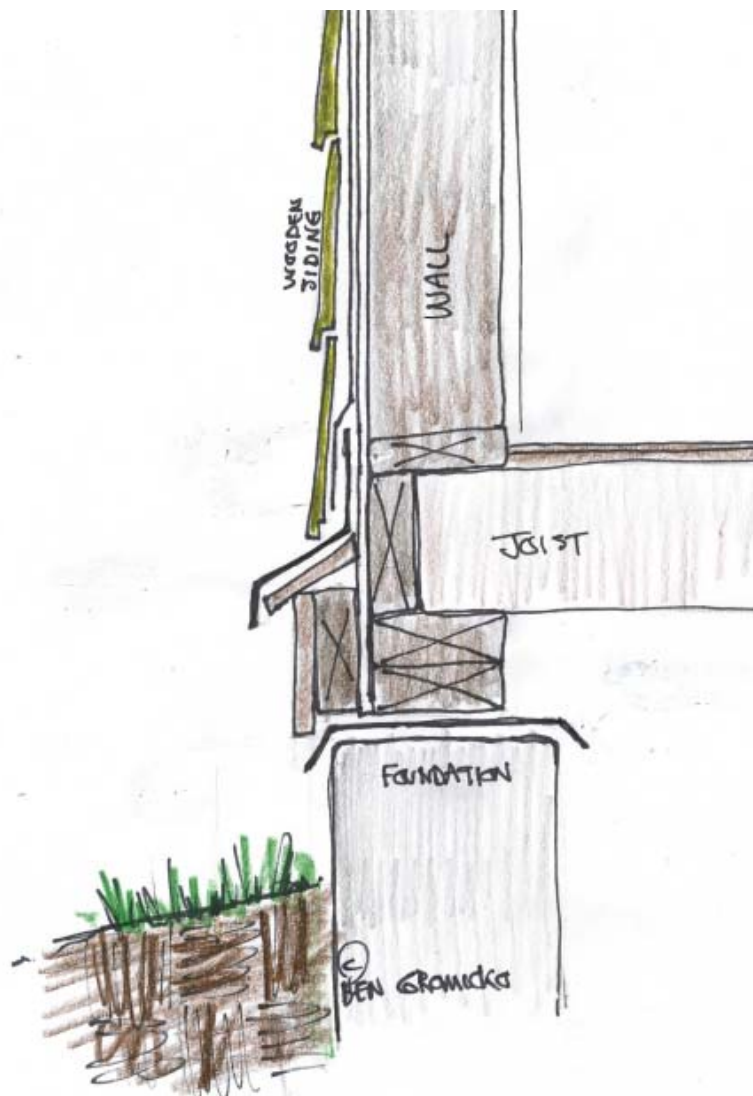
Sided houses (wooden, vinyl, aluminum) share many specifics in their construction, and in the problems that can occur.

The major difference between different types of siding is that vinyl and metal siding are waterproof, whereas wooden siding is not.

As we look at the issues for inspection siding, we will concentrate on wooden siding with the understanding that all siding types are pretty much the same.

Thermal Imaging for Home Inspectors

Moisture in Building Materials – Siding



Wooden siding base flashing, installed at the base should be equipped with metal flashing, both on the wall and at the sill plate. The flashing should extend behind the siding and be installed under the house wrap with, at least, a 4" lap.

Of course, the grade should be at least 8" below the lowest siding course.

Thermal Imaging for Home Inspectors

Moisture in Building Materials – Siding



Window and door flashing should be installed both above and below the wall opening. The head flashing should be installed under the house wrap and flashing tape and the sill or threshold flashing should extend under the sill or threshold.

Copper flashing is best, but galvanized or plastic flashing is also seen because of its lower price.

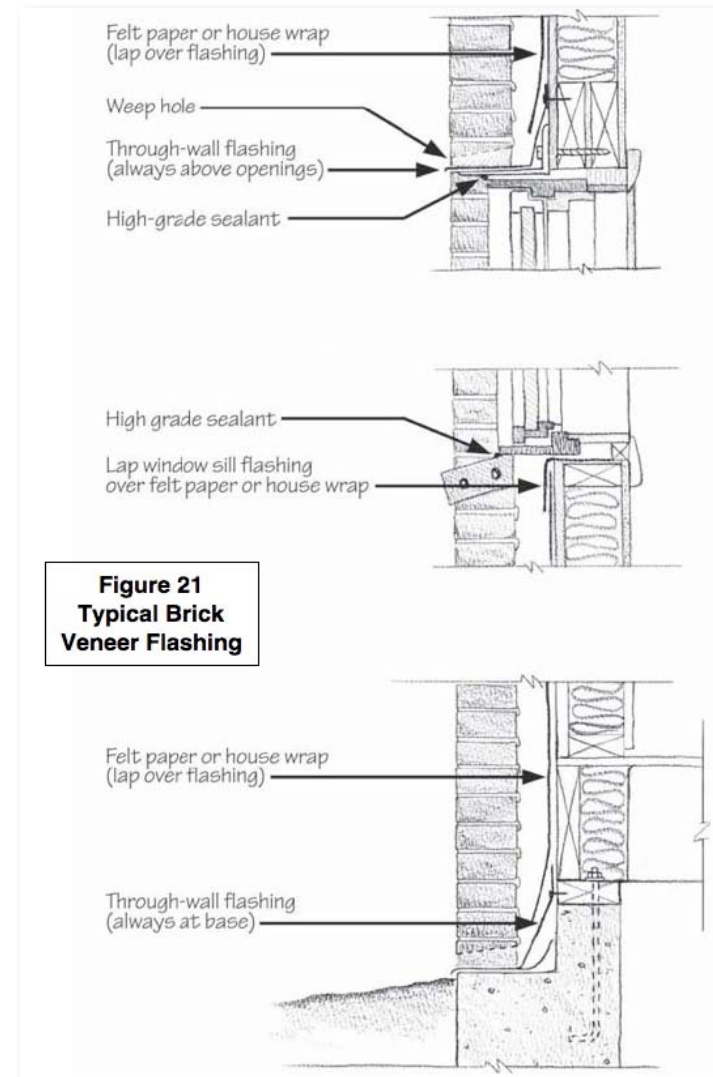
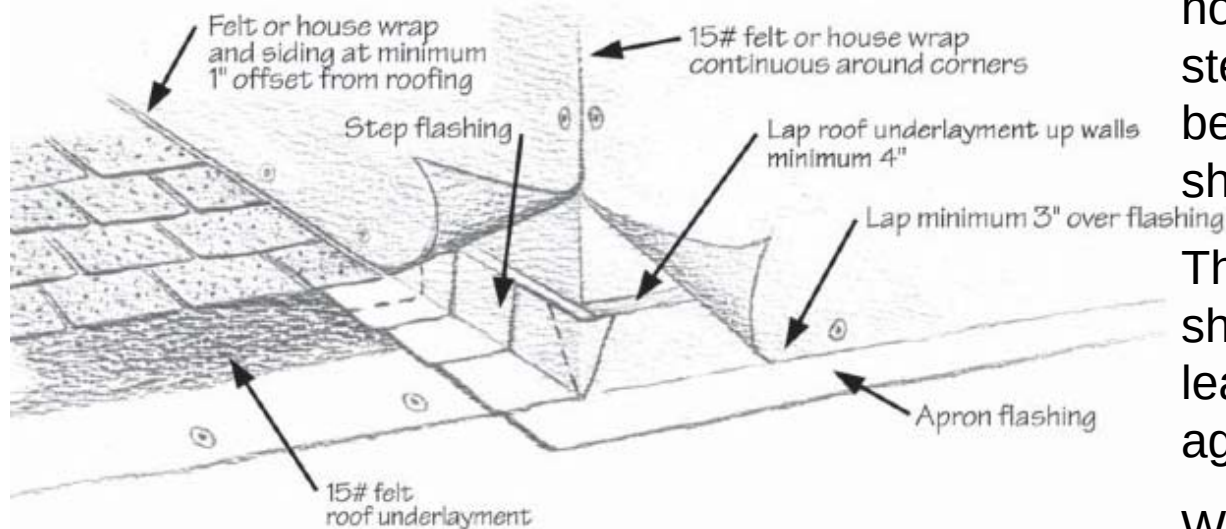


Figure 21
Typical Brick
Veneer Flashing

Thermal Imaging for Home Inspectors

Moisture in Building Materials – Siding



Rake flashing should extend under the house wrap and the step flash tins should be interlaced with the shingles.

The wooden siding should be cut back at least 2" to guard against wicking.

With wooden siding, the flashing should always be visible while vinyl and metal siding will terminate in J bar.

If this interface is caulked, beware!

Thermal Imaging for Home Inspectors

Moisture in Building Materials – Siding



Decks, porches and balconies must also be flashed.

Flashing should extend under the house wrap and cover the ledger board.

Since the wood is usually treated, aluminum or copper flashing will corrode.

All these areas should also be scanned from the interior, if possible.

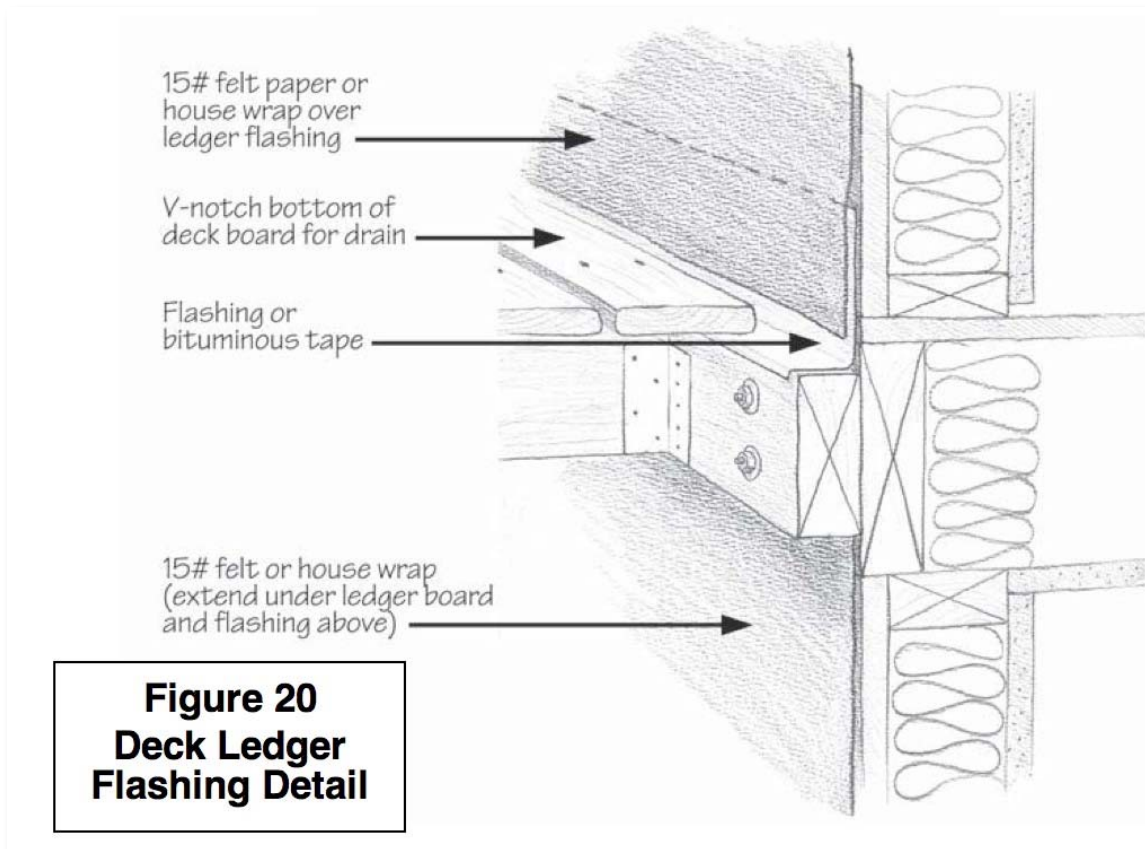


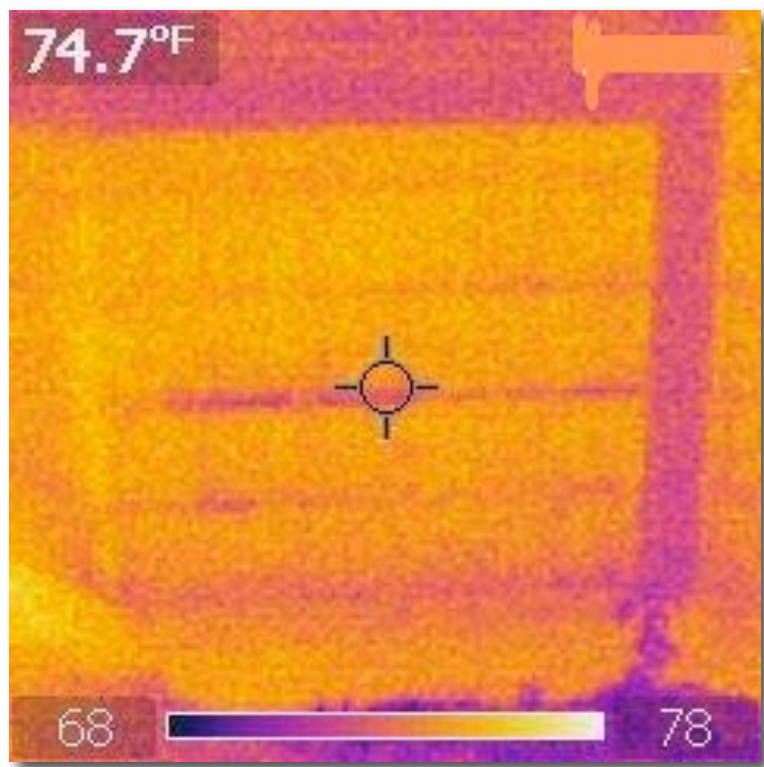
Figure 20
Deck Ledger
Flashing Detail

Thermal Imaging for Home Inspectors

Moisture in Building Materials – Wooden Siding



Wooden shingle siding.
Displays no visible problems.



Thermal imaging reveals moisture buildup. This was verified with moisture meter readings. Thermal imaging can be a great screening tool, but must not be solely relied upon. Always verify with other means!

Thermal Imaging for Home Inspectors

Moisture in Building Materials – Wooden Siding



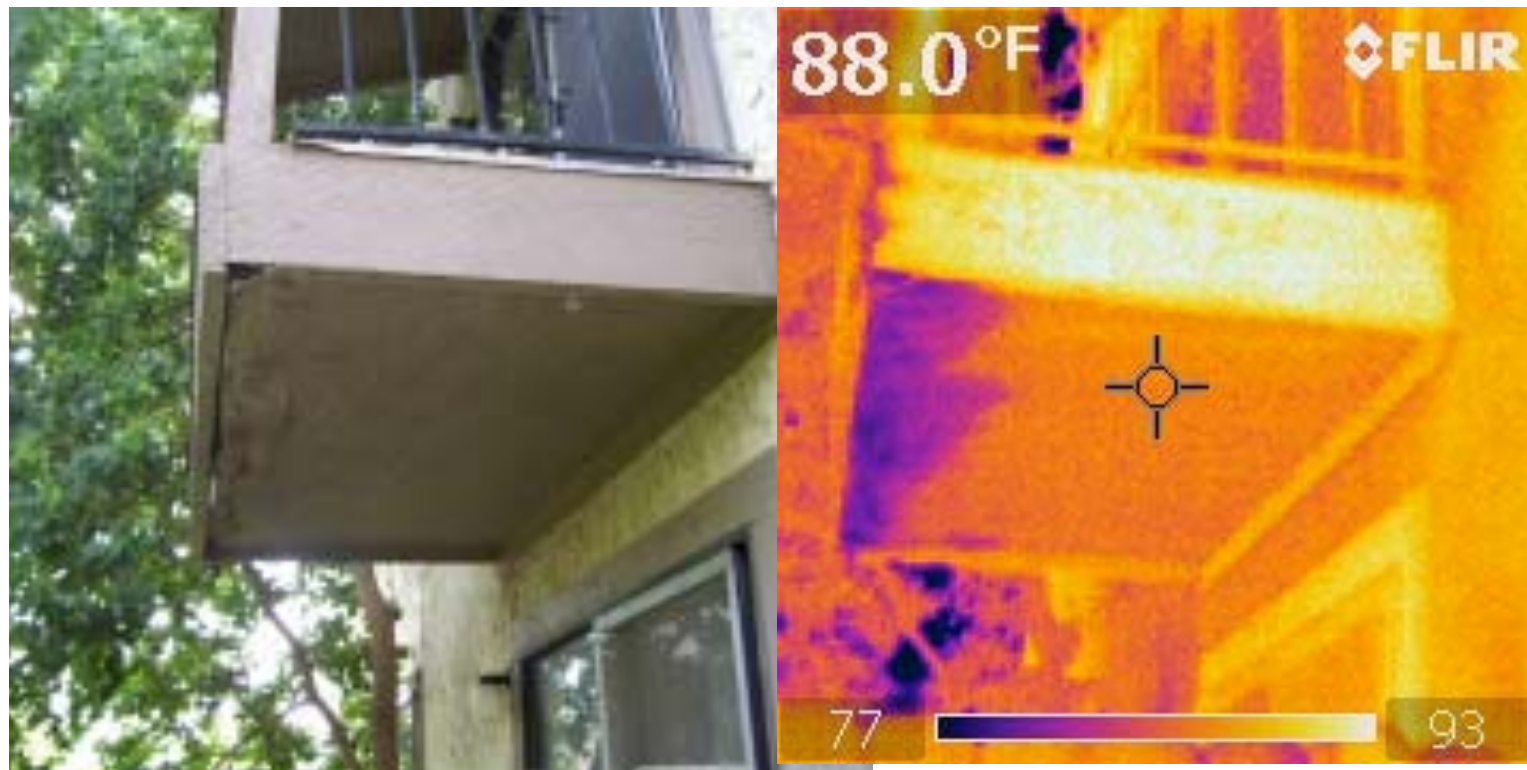
Leakage from downspout and gutter behind wooden siding.

Don't entirely rely on the camera. Use your eyes and brain as well.

Pictures courtesy of Scott Wood

Thermal Imaging for Home Inspectors

Moisture in Building Materials – Wooden Siding



Don't forget to check balconies. Here, it had rained recently. What if it hadn't? How could you check? What would you miss. How would you explain this of the client complained?

Thermal Imaging for Home Inspectors

Moisture in Building Materials – Wooden Siding



Leakage around window frame because of failed flashing.

With all exterior scanning, remember to avoid direct sunlight reflection or to adjust the reflectivity.



Pictures courtesy of Scott Wood

©2009 InterNACHI. All Rights Reserved.

Thermal Imaging for Home Inspectors

Moisture in Building Materials - Brick



Brick veneer and brick walls present special problems for thermal imaging.

Because of the high thermal mass of brick, and its large hygric buffer capacity, moisture levels are not always easy to determine. Even if a moisture meter displays high moisture readings, that is not necessarily an indication of a problem.

Flashing is, as always, key. Understanding the hydrodynamics of the wall structure, and how the wall handles air flow, is essential.

Brick walls are, almost always, two walls. An interior, structural wall, and an exterior weather wall, with one or more air spaces between the two.

Thermal Imaging for Home Inspectors

Moisture in Building Materials - Brick

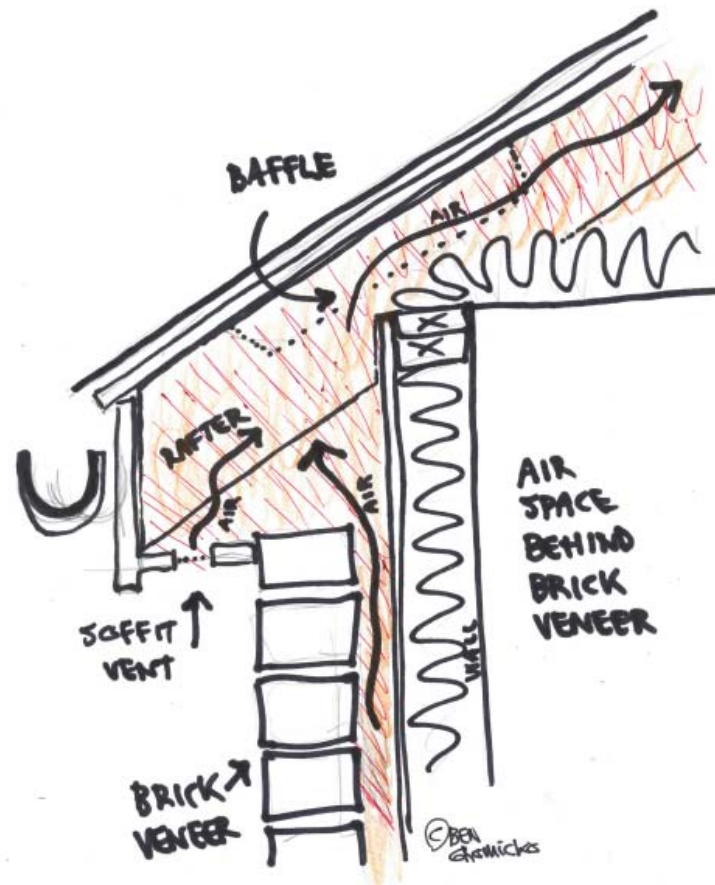


Brick veneer walls are really two walls. The outer brick wall provides most of the hygric buffer capacity.

The intervening air space (at least 1") allows the exterior brick to dry on both sides.

For proper operation, the bottom and the top of the wall system should be ventilated, allowing the free flow of air in the air space.

The exterior wall provides protection from the elements while the interior wall provides insulation.



Thermal Imaging for Home Inspectors

Moisture in Building Materials - Brick



Felt paper or house wrap
(lap over flashing)

Through-wall flashing
(always at base)

Felt paper or house wrap
(lap over flashing)

Weep hole

Through-wall flashing
(always above openings)

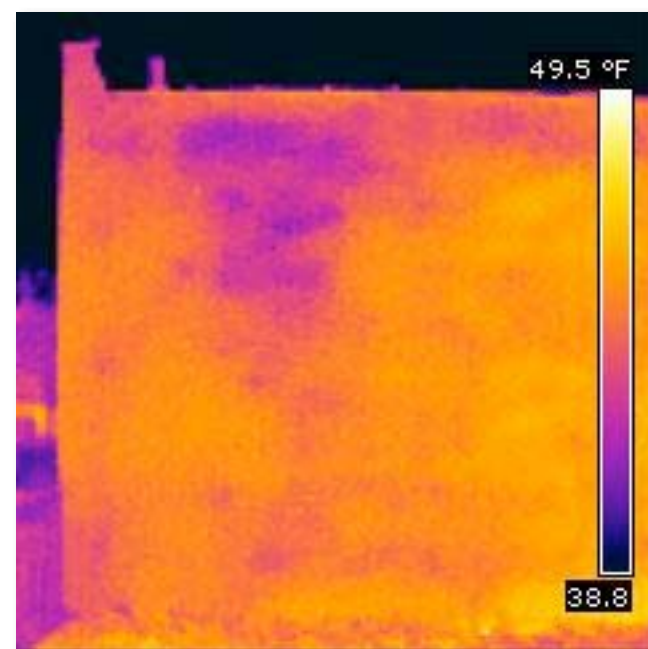
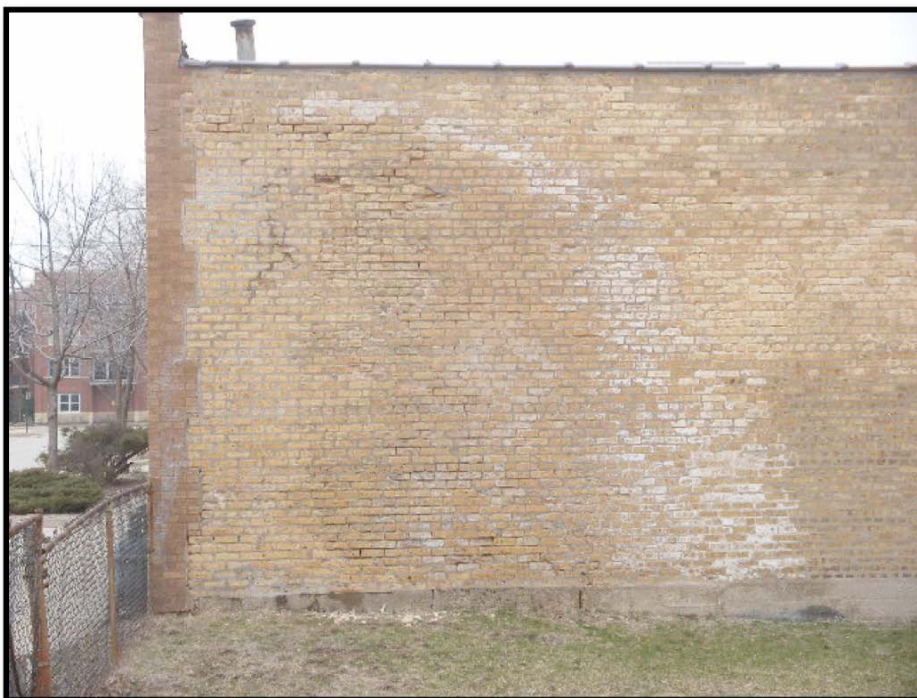
High-grade sealant

High grade sealant

Lap window sill flashing
over felt paper or house wrap

Thermal Imaging for Home Inspectors

Moisture in Building Materials - Brick

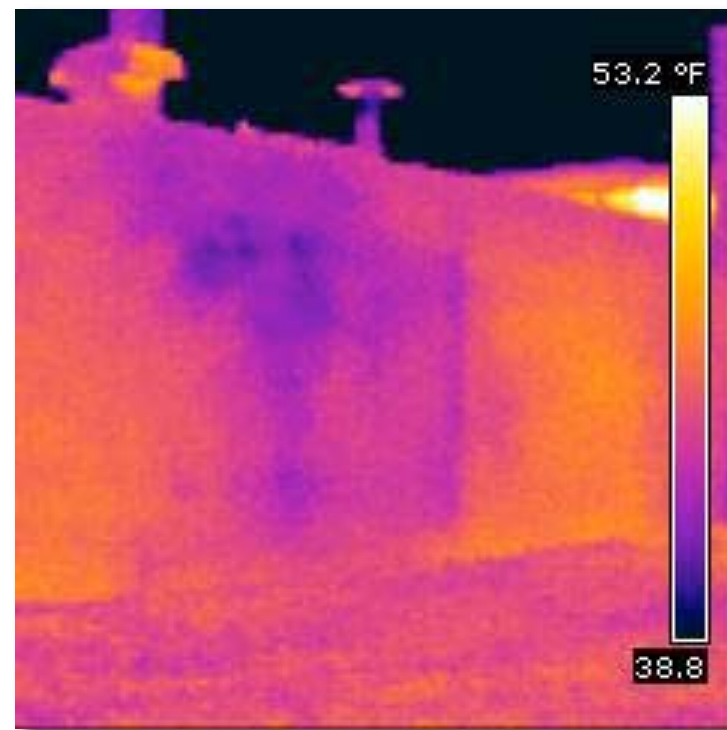


South face of a structural brick wall. Signs of moisture intrusion from failed coping tile with efflorescence and deteriorated mortar joints.

Thermal image displays moisture only in upper area with some descent.

Thermal Imaging for Home Inspectors

Moisture in Building Materials - Brick

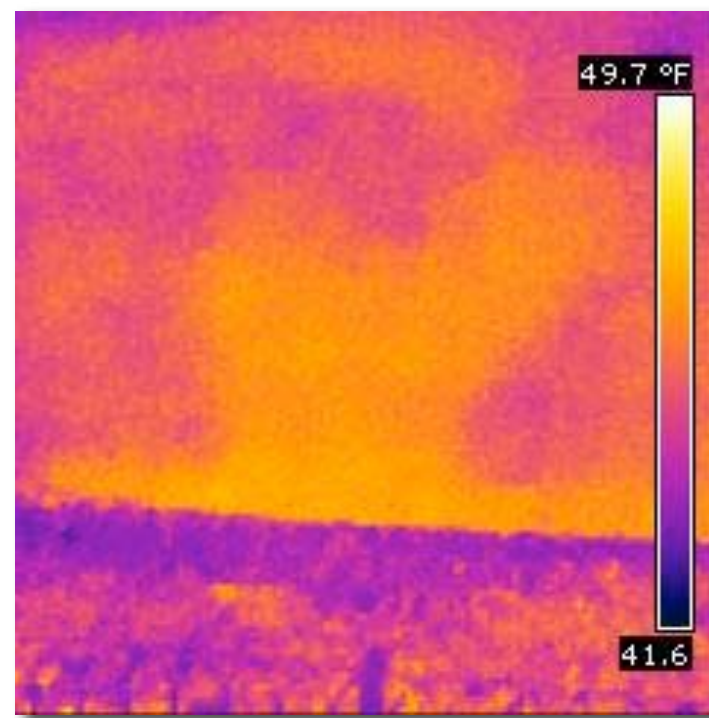


Same building, with marked mortar and brick deterioration seen. Note the efflorescence pattern, which radiates out from the most moist area.

Thermal image of the same area. Note the interior wall interface to the right of the moist area and how it wicks water into it.

Thermal Imaging for Home Inspectors

Moisture in Building Materials - Brick



Note how this section of wall, between the two efflorescence fronts, remains warmer and dryer. Efflorescence is often an indication of moisture migration and can show, if traced back, where the original water infiltration began.

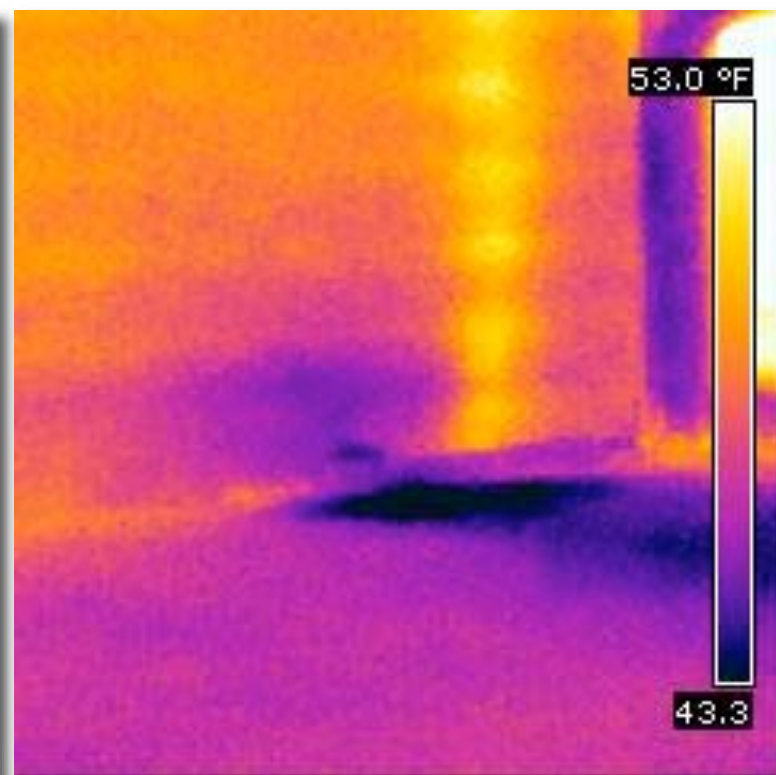
Thermal Imaging for Home Inspectors

Moisture in Building Materials - Brick



Here we see a common occurrence. The grade around the building is too high and allowing “rising damp” to wick moisture up from the grade.

Note the hotter, vertical anomaly to the on the right? What is it?



Thermal Imaging for Home Inspectors

Moisture in Building Materials - Brick

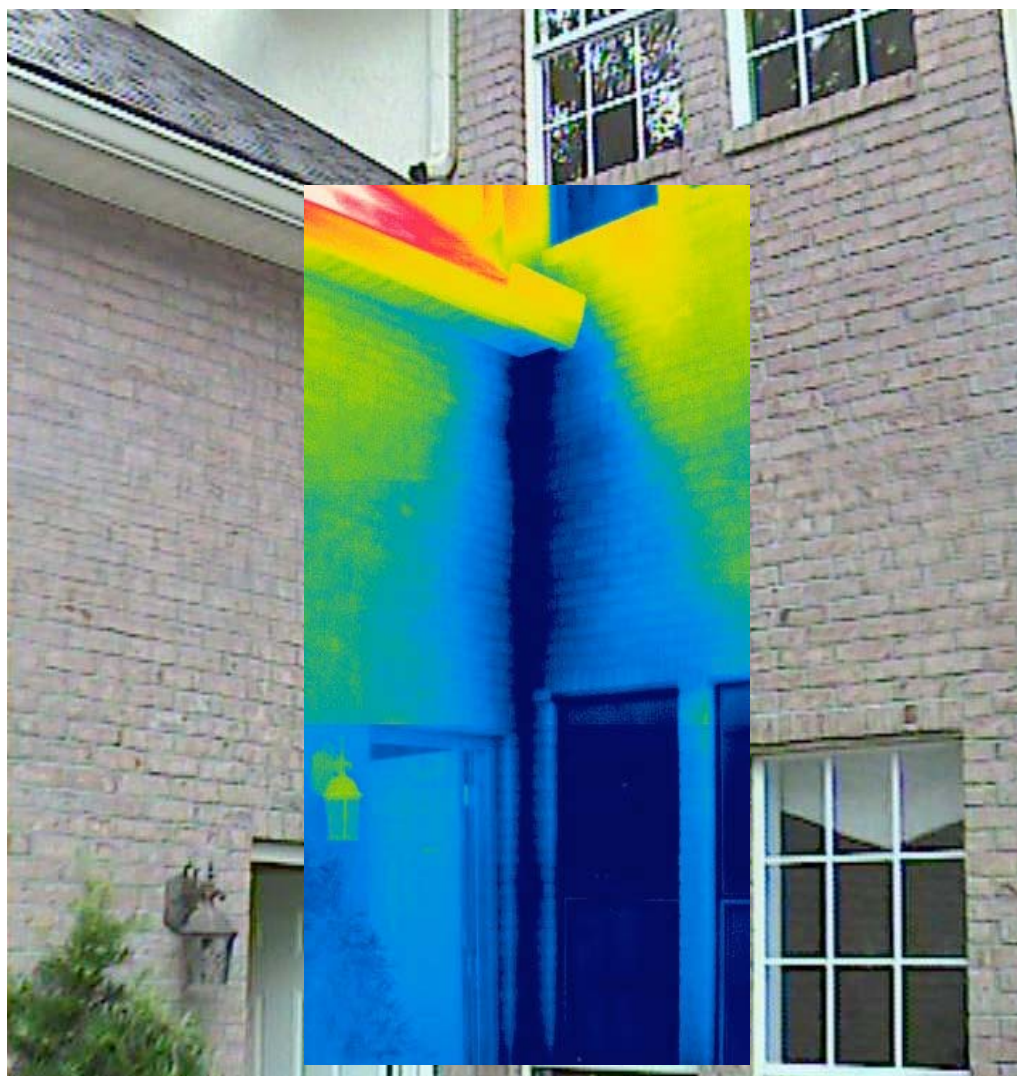


Even when kick out flashing is installed, it can still fail to perform properly.

Why is this so? Look at the picture carefully.

Always look at the house with your eyes before you check it with thermal imaging. You may find a problem, but finding the cause of the problem is a sign of a true professional.

Picture courtesy of John Fricot, FLIR



Thermal Imaging for Home Inspectors

Moisture in Building Materials - Brick



What is the cause of this colder area at the exterior corner of the house?

Is this a problem with the flashing between the stucco and the brick?



No. Just watering the lawn. The above picture was taken 3 hours after the watering stopped. Double check everything!

Thermal Imaging for Home Inspectors

Structural Member Placement



Because of the difference in thermal masses of different building materials, they will absorb and radiate heat, and infrared light, at different rates. This leads to the 'see through the wall' illusion of thermal imaging.

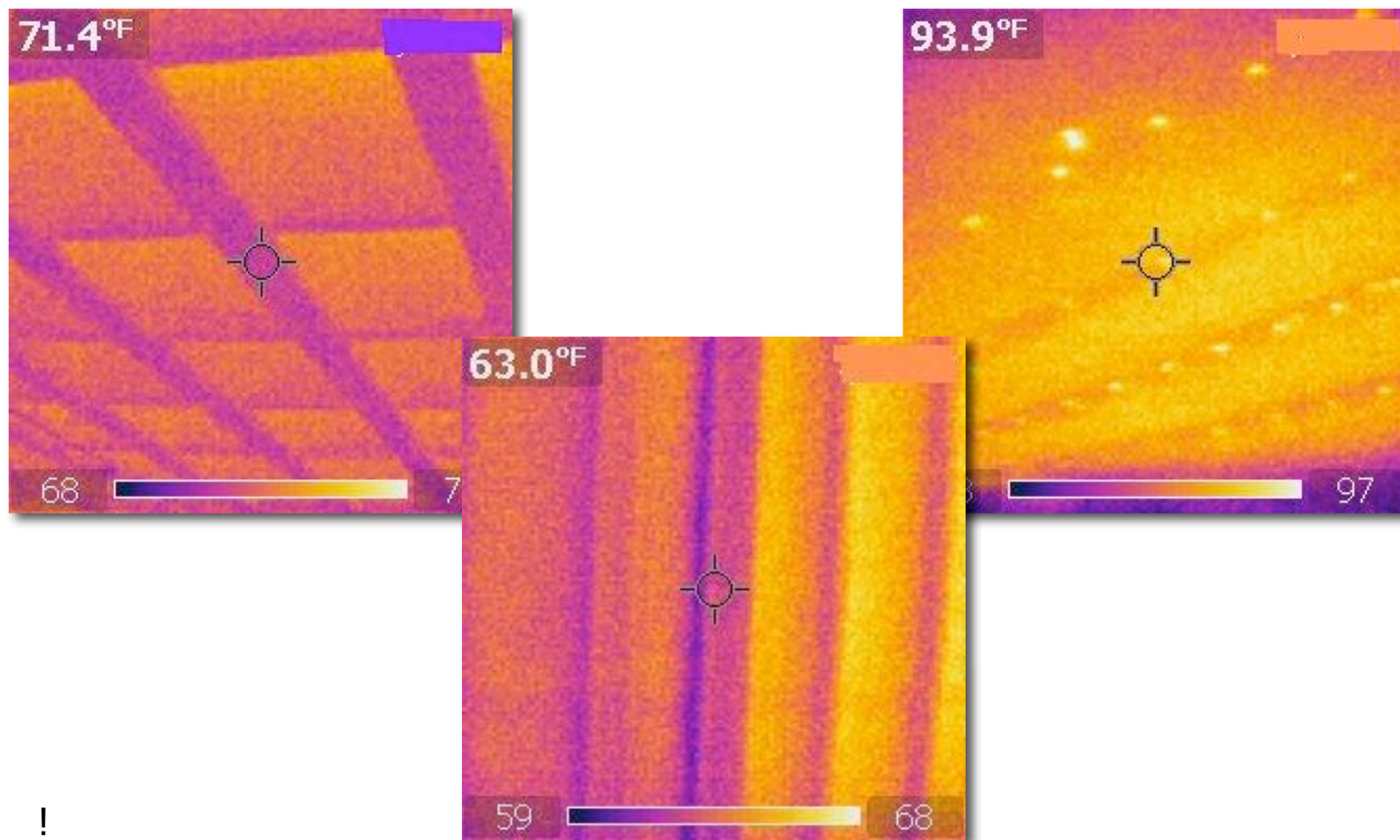
The inspector must remember that they are not really seeing through the wall but only seeing slight differences in surface temperature cause by the greater thermal mass of the material behind the surface.

It is important to make sure that you client is also aware of the difference!

The client's expectations of the inspector's ability should be well managed and made clear to avoid misunderstandings and avoid liability problems. We ain't Superman!

Thermal Imaging for Home Inspectors

Structural Member Placement



Thermal Imaging for Home Inspectors

Structural member placement

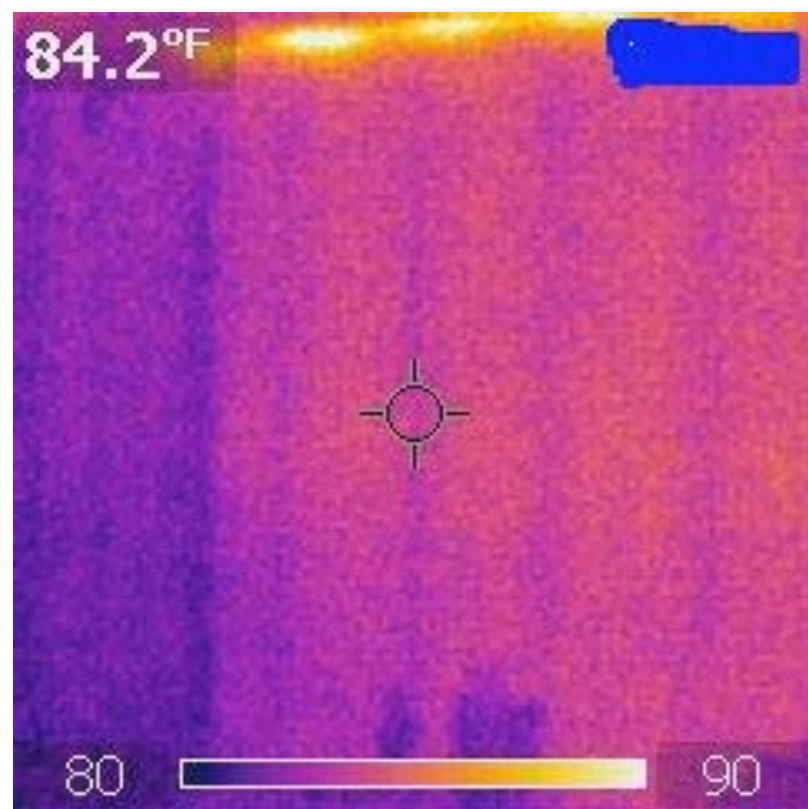


Here we see a ceiling joist structure. Note that the LVL joists on the right are slightly cooler (have slightly greater density and thermal mass) than the dimensional lumber joists on each side.

The denser (and usually stronger) structural members are slower to absorb and radiate heat.

Thermal Imaging for Home Inspectors

Structural member placement



Bedroom wall, seen in visible and infrared light. Note the studs, the insulation gap at the top and the colder readings at the inside corner where the doubles studs are.